CLAIMS

What is claimed is:

1. A molding machine, comprising:

a mold, including an upper mold plate and a lower mold plate, said upper mold plate and having a first plurality of cavities therein and said lower mold plate and having a second plurality of cavities therein, said first and second pluralities of cavities cooperating to form a plurality of mold volumes when said first and second mold plates are aligned and abutted;

an upper heat transfer platen coupled to said upper mold plate, said upper heat transfer platen having a first series of channels and a second series of channels, said first series of channels being separate from said second series of channels, wherein said first and second series of channels are substantially coplanar within said upper heat transfer platen; and

a lower heat transfer platen coupled to said lower mold plate, said lower heat transfer platen having a third series of channels and a fourth series of channels, said third series of channels being separate from said fourth series of channels, wherein said third and fourth series of channels are substantially coplanar within said lower heat transfer platen.

2. The molding machine of claim 1, wherein:

said first series of channels includes a first feeder channel and a second feeder channel running along opposing edges of said upper heat transfer platen and a first plurality of transverse channels connecting said first and second feeder channels;

said second series of channels includes a third feeder channel and a fourth feeder channel running along opposing edges of said upper heat transfer platen and a second plurality of transverse channels connecting said third and fourth feeder channels;

said third series of channels includes a fifth feeder channel and a sixth feeder channel running along opposing edges of said lower heat transfer platen and a third plurality of transverse channels connecting said fifth and sixth feeder channels; and

said fourth series of channels includes a seventh feeder channel and an eighth feeder channel running along opposing edges of said lower heat transfer platen and a fourth plurality of transverse channels connecting said seventh and eighth feeder channels.

3. The molding machine of claim 2, wherein said first and second series of channels are disposed within an adapter in communication with the upper heat transfer platen.

4. The molding machine of claim 3, wherein:

said adapter comprises a first and second orifice;

said first orifice provides fluid communication from a first source of a first heat transfer medium to said first series of channels;

said second orifice provides fluid communication from a second heat transfer medium to said second series of channels; and

said adapter is capable of independently supplying said first and second heat transfer media to the first and second series of channels.

5. The molding machine of claim 4, wherein said two heat transfer media are selected from a group consisting of steam, electrical heaters, water, oil, air, and the like.

6. The molding machine of claim 4, wherein said two heat transfer media include a medium to add heat and a medium to remove heat.

7. The molding machine of claim 2, wherein:

said first and second pluralities of transverse channels are vertically offset by a maximum of about one times a diameter of said first plurality of transverse channels; and

said third and fourth pluralities of transverse channels are vertically offset by a maximum of about one times a diameter of said third plurality of transverse channels.

8. The molding machine of claim 2, wherein:

said first and second pluralities of transverse channels are substantially coplanar; and

said third and fourth pluralities of transverse channels are substantially coplanar.

9. The molding machine of claim 2, wherein:

said first plurality of transverse channels are relatively substantially parallel, said second plurality of transverse channels are relatively substantially parallel, and said first plurality of transverse channels are substantially parallel to said second plurality of transverse channels; and

said third plurality of transverse channels are relatively substantially parallel, said fourth plurality of transverse channels are relatively substantially parallel, and said third plurality of transverse channels are substantially parallel to said fourth plurality of transverse channels.

10. The molding machine of claim 1, further comprising a ram coupled to said lower heat transfer platen.

11. The molding machine of claim 10, further comprising a plurality of thermal insulation plates.

12. The molding machine of claim 11, wherein at least a portion of said thermal insulation plates are intermediate said ram and said lower heat transfer platen.

13. The molding machine of claim 10, further comprising a control system for controlling movement of said ram.

14. The molding machine of claim 1, further comprising a mold protection device for monitoring the operation of the molding machine.

15. The molding machine of claim 14, wherein said protection device includes a linear measurement device.

16. The molding machine of claim 14, wherein said protection device includes a pressure measurement device.

17. The molding machine of claim 14, wherein said protection device includes a linear measurement device and a pressure measurement device.

18. A compression molding machine, comprising:

a movable ram;

a static head; and

a protection system.

19. The molding machine of claim 18, wherein said protection system includes:

a linear measurement device for measuring a position of said ram;

a pressure measurement device for measuring a pressure exerted by said ram; and

a controller coupled to said linear measurement device and pressure measurement device.

20. The molding machine of claim 19, wherein said controller contains a plurality of programmable triggers to ensure the molding machine is operated in a safe manner.

21. The molding machine of claim 20, wherein engagement of one of said variable triggers disengages said ram.

22. The molding machine of claim 20, wherein said plurality of triggers are based on measurements from said linear measurement device or said pressure measurement device.

23. The molding machine of claim 20, wherein said plurality of triggers are based on measurements from said linear measurement device and said pressure measurement device.

24. The molding machine of claim 20, wherein said controller contains a variable trigger for transitioning between a first ram speed and a second ram speed, said first ram speed being faster than said second ram speed.

25. The molding machine of claim 20, wherein said controller contains a variable trigger for disengaging said ram if a measurement from said pressure measurement device exceeds a predetermined value.

26. The molding machine of claim 20, wherein said controller contains a variable trigger for transitioning between a relatively low pressure limit and a relatively high pressure limit.

27. The molding machine of claim 26, further including a second variable trigger for disengaging said ram if a measurement from said pressure measurement device exceeds said relatively high pressure limit.

28. The molding machine of claim 26, wherein said controller contains a second variable trigger for transitioning between a relatively high pressure limit and a relatively low pressure limit.

29. The molding machine of claim 28, further including a third variable trigger for disengaging said ram if a measurement from said pressure measurement device exceeds said relatively low pressure limit.

30. The molding machine of claim 20, wherein said controller contains a variable trigger for limiting the maximum extension of said ram.

31. The molding machine of claim 20, wherein engagement of said variable trigger disengages said ram.

32. The molding machine of claim 18, wherein said protection system is operatively coupled to said ram and controls movement of said ram.

33. The molding machine of claim 32, wherein said protection system extends said ram at a plurality of speeds.

34. The molding machine of claim 33, wherein said plurality of speeds include:

a first speed for moving said ram from a withdrawn position; and

a second speed for moving said ram into a molding position.

35. The molding machine of claim 34, wherein said first speed is faster than said second speed.

36. The molding machine of claim 33, wherein said plurality of speeds include:

a first speed of about one inch per second; and

a second speed of about one inch per minute.

37. A molding machine, comprising:

a heat transfer platen having a first series of channels and a second series of channels, said first series of channels being separate from said second series of channels, wherein said first and second series of channels are substantially coplanar within said heat transfer platen.

38. The molding machine of claim 37, further comprising a third series of channels disposed within said heat transfer platen.

39. The molding machine of claim 38, wherein said molding machine is capable of independently supplying a first heat transfer medium to said first series of channels, a second heat transfer medium to said second series of channels, and a third heat transfer medium to said third series of channels.